LEXINGTON.

REVISED DESIGN

IN COMPETITION FOR PROPOSED

CENTENNIAL EXHIBITION BUILDING,

FOR EXPOSITION OF

Industry of all Nations,

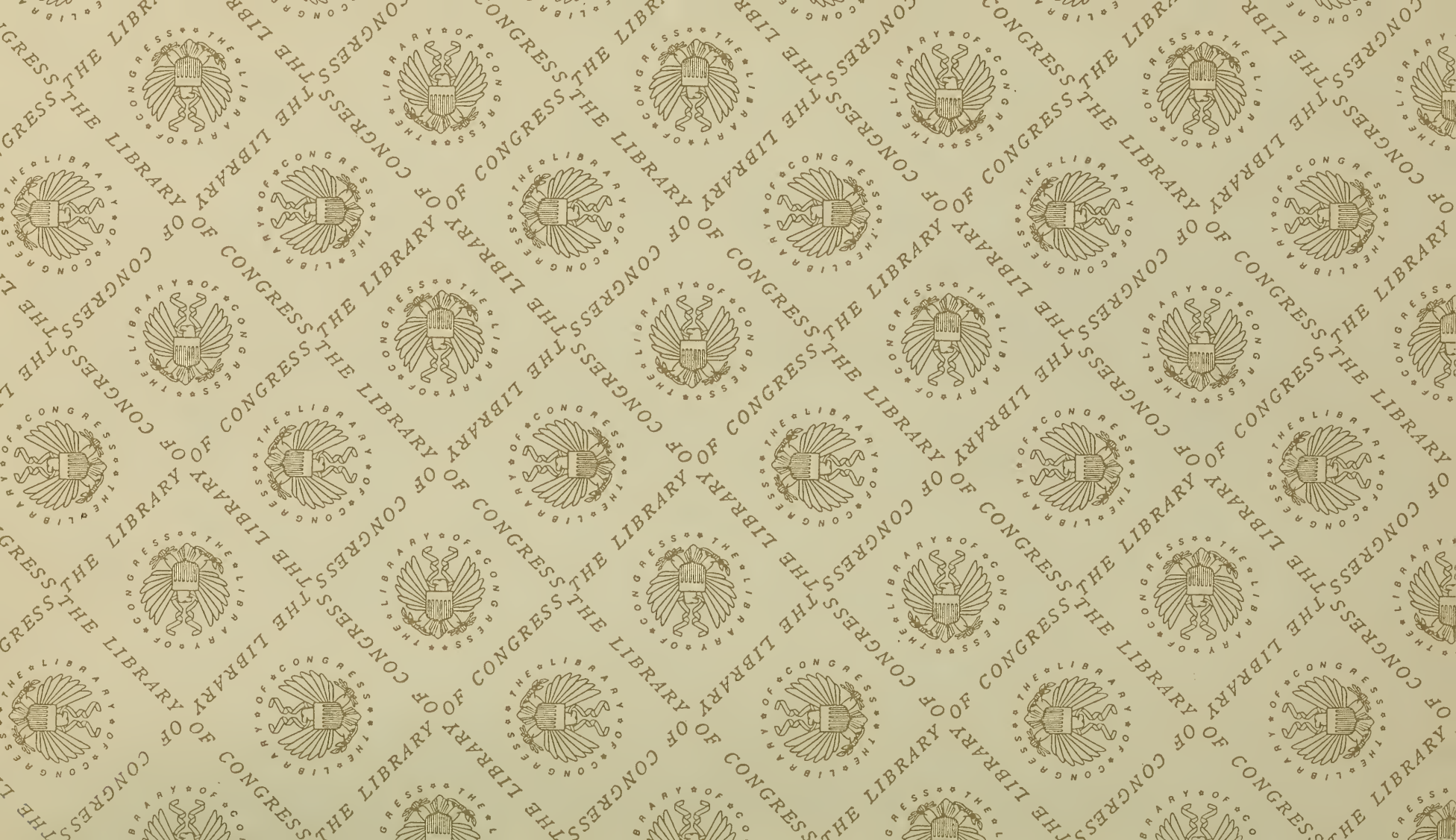
1776. 1876.

TO BE HELD IN PHILADELPHIA IN 1876.

JOHN McARTHUR, JR.,
JOSEPH M. WILSON, C. E., } ARCHITECTS.

PHILADELPHIA:
KING & BAIRD, PRINTERS, 607 SANSOM STREET.
1873.

YORKTOWN.


THE LIBRARY OF CONGRESS

LEXINGTON.

REVISED DESIGN

IN COMPETITION FOR PROPOSED

CENTENNIAL

EXHIBITION BUILDING,

FOR EXPOSITION OF

Industry of All Nations,

1876.

TO BE HELD IN PHILADELPHIA IN 1876.

JOHN McARTHUR, JR.,
JOSEPH M. WILSON, C. E., } ARCHITECTS.

PHILADELPHIA:
KING & BAIRD, PRINTERS, 607 SANSOM STREET.
1873.

YORKTOWN.

LIST OF PLANS

TO ACCOMPANY REVISED DESIGN.

---

1. South Elevation, Main Building.
2. Plan of first floor, Main Building.
3. Plan of second floor, Main Building.
4. Plan of basement of Memorial Hall.
5. Section through Memorial Hall.
6. Section through Temporary Building.
7. Block Plan.
8. Supplementary Block Plan.
9. Plan showing Temporary Buildings removed.
10. Perspective of Memorial Building.
11. Interior Perspective of Memorial Hall.

Plans, Elevations, &c., of Preliminary Design.

TO THE HONORABLE
THE COMMITTEE ON PLANS AND ARCHITECTURE,
OF THE U. S. CENTENNIAL COMMISSION:

GENTLEMEN:—

In presenting our modified preliminary plans of the proposed Centennial Exposition Buildings, for a second and final competition, we respectfully call attention to the following *essential* and consequently *important considerations.*

1st. Our design can be executed without fail between now and 1876.

2d. It admits of the most plain and common sense application of the dual classification.

3d. It is built of the ordinary materials—iron, brick and wood—in every day use in the United States, and they are used according to the latest and most improved methods of construction.

4th. Both the exterior and interior effects are more imposing than those of any previous Exhibition Building in the world.

5th. The ordinary rolled sections of wrought iron having been used, and the reduplication of parts having been carefully attended to in working up the design, the result is that these superb effects can be obtained at the most reasonable cost.

6th. We confidently believe that the Memorial Hall will be found, when left standing alone after the Exhibition is over, to be a fair representative of the progress which America has made in Engineering and Architecture during the past one hundred years. We have made the following modifications in our design:

Modification of original design.

First, we have abandoned altogether the use of galleries for exhibition purposes; and secondly, we have simplified the construction of the temporary portion of the building; omitting the towers and modifying the fronts so as to lessen as far as practicable, the cost of this part of the structure, consistent with a creditable appearance, and a proper adaptation to the purposes in view. The space formerly provided in the galleries has been transferred to the first floor, thereby enlarging the plan, and in this respect, perhaps, increasing the expense; but there is no doubt as to its being a decided improvement for exhibition purposes. In order to obtain good views of the scene below, narrow galleries have been placed in the Memorial Hall, and in certain parts of the Temporary Buildings; but they have not been included in what would be denominated the exhibition space of the structure.

The block plan.

The block plan shows the general arrangement of the building, and its accessories. The portion tinted carmine, represents the Memorial Hall; and that tinted India ink, is the temporary part.

General Description.

The modified design comprises a central, permanent, Memorial Hall, flanked by two equal temporary wings. The Memorial Hall itself forms a complete design, either alone or in connection with the temporary parts.

Memorial hall.

The Memorial Hall consists of two principal parts crossing each other at right angles, forming a nave with transepts, at the intersection of which, in the centre,

The tower.

rises a tower. This is entirely of skeleton construction, built of wrought iron, and the lower portion open, so as to obstruct the view as little as possible; being

formed of sixteen columns, arranged in sets of four each, with those of each set braced vertically and laterally, to resist the heaviest winds. The exterior portion above the roof of the building, is covered with galvanized iron on the vertical sides, and slate on the roofs; and at proper intervals in the height, floors are laid to furnish outlooks to visitors; access being had to the same, by convenient stairways and steam elevators. Platforms are intended on the ridges of the main roof, accessible from the tower. These platforms will not be observed from the ground below, and will be found very attractive as promenades. The four main fronts of the building are each designed so as to be finished and complete in themselves, when the temporary structures are removed. The south front, which we consider the main approach, provides on the first floor an ample entrance flanked by waiting rooms, both for ladies and gentlemen, with all appropriate conveniences; also, coat room, telegraph office, and news stand. A portion of the area under the main roof, and not interfering with the classified exhibits, is devoted to restaurant purposes, as also are open corridors or porches on the sides. A basement is intended under this front, divided into kitchens, pantries, rooms for steam boilers, fuel, cellars, &c.; boilers will furnish steam for cooking, for heating the buildings when necessary, and for motive power for elevators. The kitchens connect with restaurants above by dumb waiters. From the first floor, the second floor is reached by wide stairways. It contains a foyer or concert room, retiring rooms, and some smaller rooms which may be used by commissioners, or rented to officials representing the various countries exhibiting. Such rooms will be found very convenient, and can readily be let at remunerative rates. The foyer opens on a gallery next to the in-

Stairways and steam elevators.

South entrance or main approach.

Restaurant.

Kitchens, Pantries, Steam boilers.

Foyer or concert room.

Galleries.

*

terior of the building, which communicates with open corridor restaurants at the sides, and connects with galleries extending around into the transepts, and having stairways in the transept towers to the first floor. The foyer communicates in the front of the building with an open air promenade over the main carriage porch. The north front provides on the first floor, the proper conveniences for visitors entering at this end of the building; and also contains a restaurant within the building, and open corridor restaurants at the sides. Wide stairways communicate to a large organ and orchestra or chorus gallery, from which side galleries run the whole length of the nave and around into the transepts, the same as those from the south front. Under this front is a basement or cellar, that may be used for the same purposes as that under the south front. There is ample water closet accommodation on the first floor of the transept towers. The Memorial Building being intended to be permanent, there are certain features in the way of kitchens, cellars, heating apparatus, &c., introduced, not so much on account of being required now, as that they will be needed in the future.

North entrance.

Organ.

Orchestra gallery.

Temporary portion of the building.

The two equal portions of the temporary building connecting with the permanent building at the transepts, may be said to consist each of a nave, with transepts facing north and south. The nave is available directly for exhibition purposes, forming with the transepts of the Memorial Building, a grand space of 2,040 feet long by 360 feet wide. In the transepts are located offices, ample waiting rooms, restaurants, &c., as will more fully appear on examination of the plans. These departments all require provision to be made for them, and we prefer placing them in transepts, distinct as it were from the exhibits, yet convenient to them, thus allowing

Grand space for exhibits, with offices, &c.

us to obtain the necessary projections for a fine facade to the elevation, and at the same time fully utilizing all of the space.

Nave and Transepts.

The width of the nave, 360 feet, is made up of a centre span of 120 feet, two spans of 72 feet, and four spans of 24 feet each. Small galleries have been introduced in the transepts and at the ends of the naves, the latter communicating with outside terraces or porticoes, from which fine views can be obtained. The suites of rooms in the second floor of transepts, can be made use of for bureaus of foreign commissions, &c. It will be seen by reference to the cross sections, that ample light has been obtained for the whole building without resort to skylights.

Light.

There are certain portions of the temporary buildings contiguous to the Memorial Hall, and marked *AA*, *BB*, on the block plan, that have been taken in our computations of areas, estimates, &c., as temporary, but which we would recommend to your committee, if possible, to retain as permanent, when the temporary buildings are removed. The open corridors or porches, AA especially, now intended for restaurant purposes, will be found very pleasant adjuncts to the permanent building, and in working up the perspective for this, we have shown them as retained.

Entrances and exits.

We would call attention to the great number of openings that we have provided for the reception of goods. The main entrances are all large and commodious, and all of the first story windows open to the floor, in the temporary and permanent building, forming *doors of* 10 *feet width of opening, one occurring on the side of the building every* 24 *feet.* These are all available for the reception of goods, and may be used or not after the exhibition opens, as

Levels and grades.

may be desired. The level of the floor of the building has been assumed at 118, and of the ground outside the walls, at 114, which is about the grade of Belmont avenue. This will allow us to cross Belmont avenue with our temporary tracks at grade, and run them into the building 4 feet below the level of the floor. This is the standard height adopted in this country for freight platforms above the rails. It is the most convenient for unloading, as it brings the floor of car level with the platform of building; and joist can easily be introduced and floored over a few days before the exhibition opens, leaving the track below ready for use again when the exhibition is over. We have introduced four tracks through the whole length of the building, and more can be put in if desired.

Railroad communication.

Storage of empty boxes.

Underneath certain portions of the floor of the temporary buildings, considerable area occurs, and the idea has been suggested of appropriating this to the storage of empty boxes, &c. It would be very useful for this purpose, except on account of the great risk from fire, and for this reason we would not recommend it. Dust is a great trouble to exhibitors, and it is absolutely necessary to adopt the best means of removing this expeditiously and quietly. We know of no better method than that of laying the temporary floors with a narrow space between the boards, into which the dust may fall; the same as adopted in most of the previous exhibitions. This plan is open to the objection of allowing articles, carelessly dropped, to fall through and be lost. If the floors are laid close, the dust accumulates very rapidly, and must be swept up in piles and conveyed away, at considerable trouble, expense, and risk of spreading again over the exhibits. The utmost care might not prevent a match, for instance, from dropping through one of these openings, and the presence

Risk from fire.

Removal of dust.

of boxes and packing cases below, would increase the risk of fire immensely.

Drainage.

Plan No. 8 shows the system of drainage proposed for the building, to connect with a main sewer on Forty eighth street. It also shows the arrangement of water supply, fire plugs, and gas pipes.

Lighting with gas, and night exhibitions.

No previous exhibitions have been artificially lighted, or open at night, on account of the danger from fire. There is no doubt that the receipts would be vastly increased, if such an arrangement were possible. The public in this country are not as well accustomed to day exhibitions as in Europe; and our previous experience in all cases has been, that the evening receipts amount to a large proportion of the total. What we propose is, to light the building by large reflectors, such as are used in our railroad depots, suspended from the roof, and rows of lights along the various iron cornices, where necessary, the gas being ignited by means of electricity, as now in practical use in many places. Gas itself drops no sparks. By such a method of lighting, the burners being far above anything inflammable, the risk of fire would be at a minimum.

Dimensions.

Dimensions.

The following are the principal dimensions of the building:

Memorial Hall.

Length of nave, exclusive of waiting rooms at ends, ...	720 feet.
Length through transepts, ...	456 "
Span, in clear, of nave and transepts, each,	216 "

TEMPORARY BUILDING.

Extreme length of each nave, ...	884	feet.
Length through transepts, ...	700	"
Total width of nave, ...	360	"
" " transepts, ...	312	"
Extreme total length of whole building, . .	2,224	"
Area available for classified exhibition purposes, 734,400 square feet, ...	16.86	acres
Portion of Memorial Hall available for unclassified Exhibition purposes, 67,392 sq. feet, .	1.55	"
First floor area for restaurants, not including open air corridors, 177,808 square feet, . .	4.08	"
Total first floor area for exhibition and restaurants, without open corridors, ...	22.49	"
Area of open corridors, first floor, 26,400 square feet, ...	0. 6	"
Area for offices, waiting rooms, &c., . . .	2. 3	"
Total area first floor, ...	25.39	"
Height of central tower to extreme top of finial, ...	500	feet.
Side of square base of tower, ...	120	"
Height of nave, floor to ridge of roof, . . .	148	"

Comparison with other buildings.

By way of comparison, in order to obtain an idea of the dimensions given above, we would state that the span of the roof of the Memorial Hall, 216 feet, is 16 feet greater than that of the Grand Central Depot in New York City; that the centre span of the nave of the temporary building, viz., 120 feet, is exactly the same as that of the grand nave at Sydenham Crystal Palace, London, and that the width of the square base of tower, 120 feet, is very nearly the same as the outside diameter of the dome on the Capitol at Washington; the height of this tower, 500 feet, being the greatest in the world.

The extreme height of the dome at

Washington is, ...	287 feet	5½ inches.
St. Peter's, at Rome, ...	430	"
Spire of Friburg Cathedral, ...	385	"
Spire of Strasburg, ...	468	"
Spire of St. Stephen's, Vienna, . .	441	"
Spire of Town Hall, Brussels, . . .	374	"
Spire of Antwerp Cathedral, . . .	406	"

The spires of Cologne Cathedral, when finished, according to the original design, will be 510 feet high, and the height of tower of the new public buildings for the City of Philadelphia, when completed, will be 450 feet. As it regards the height of the nave of the Memorial Hall, which is 148 feet above the floor, we would state that the height of the

Nave at Strasburg is	101	feet.
" Cologne Cathedral, . .	155	"
" St. Peters, at Rome, . .	150	"
" Bourges, France, . . .	117	"
" Chartres, ...	106	"

We are confident that a far finer and grander effect can be produced by a tower as we have designed it, at much less cost than by a dome. The only *iron* dome of any size in existence, with which comparison can be made, is that at Washington. This dome having the same diameter at base as our tower, and far less height, cost $950,000, exclusive of the base of the old dome which extended from the ground to the height of 68 feet. In estimating for the cost of the tower, we beg to state that we have computed all of the material necessary to resist safely the greatest stresses that can come upon it, and have made our estimate from the number of pounds weight of this material, so that we believe our figures are correct.

Classification.

Dual classification.

Plan 2 shows distinctly the adaptability of our design to the dual classification, as desired by your committee. It will be seen that quite a large part of the Memorial Hall enters into this classification, and the portion of the north nave not available, will be found of great use for special miscellaneous exhibits. The Paris Exhibition of 1867, had in the part devoted to the same exhibits as intended to be included in this portion of our building, a space 296 feet wide, and containing 18.27 acres. In this design we have a space 360 feet wide, and an area of 16.86 acres. In allotting the amount of space to the different departments, it is not easy for us to say what proportion is required for each, and we presume this can only be decided when more is known of the demands of the various countries. The arrangement of relative spaces, therefore, is not considered as absolute, but can be varied as necessary. The only point we would advise is the retaining in any event of the central aisle for the main nave, as the effect of the exhibition will be greatly enhanced thereby. A central aisle is absolutely necessary for a proper display of the building and its exhibits, and with the proportions of our structure, there is no reason why we should not produce even *grander* effects than those which have been attained at Sydenham. We show further on, how the area for classified exhibits may be increased, if found necessary, during the progress of the building, without any alteration in the design, at a moderate expense, and with a still further utilization of the space in the Memorial Building now devoted to miscellaneous exhibits.

Special and miscellaneous exhibits.

We claim for this plan, and the arrangement of dual classification, as shown, several advantages over what may

be obtained in a circular form of building. There are no diminishing areas approaching a centre, as in a circular design. The fine appearance of the exhibition and beautiful vistas are much improved in the rectangular building over the circular, by the fact that we have an uninterrupted interior view of 2224 feet, which cannot be obtained in any circular building, and we think we combine in this plan, the beauties of the London, 1851 exhibition, with the fine classification of the Paris, 1867. It may be said, that the elliptical or circular building allows each department to be connected all the way round, forming a continuous curve; but this advantage, if it be one, does not obtain in a design on the semicircular plan, any more than in a rectangular one.

Advantages of rectangular buildings.

For exhibition purposes.

Materials and Mode of Construction.

In the Memorial Building, the foundations are intended to be of stone, with a granite base course from the ground to the level of the first floor, above which the walls are to be composed of brick of various colors, with the introduction of terra-cotta tiles and stone. The first floor over the cellars or basements at north and south fronts, is supported upon brick arches springing from wrought iron I beams, resting upon brick piers and arches. This portion of the floor, and also that in the transept towers, is to be laid in tile or artificial stone. The floor in the main portion of the building devoted to exhibition purposes, is intended for the present, to be laid with boards upon timber joist, and pile foundation, the same as proposed for the temporary portion of the building. After the exhibition closes, this floor can be taken up, and one of artificial stone or slate put down. The second story rooms in the fronts and the galleries to have wooden

Stone foundations.

Granite base.

Brick superstructure.

Permanent floors.

Temporary floors.

floors, laid on timber joist. The interior walls are to be finished in brick of various colors.

Roof trusses. The main roof trusses are designed on the principle of the braced arch, and are to be of wrought iron. The purlins are of wrought iron, and the roof covering of corrugated galvanized iron. The whole has been carefully calculated to withstand the heaviest loads that can come upon it, including a horizontal wind pressure of 40 pounds to the square foot. The gable ends are to be of galvanized iron, with double, or interior and exterior face, stiffened with wrought iron.

Main tower. The main tower is to be constructed entirely of wrought iron frame work, thoroughly stiffened by diagonals and laterals, so as to withstand safely a wind pressure of 40 pounds to the square foot, which is assumed to be the maximum force of a tornado. The vertical sides are to be covered with galvanized iron, and the roofs with slate. The various floors in this tower are to be constructed of timber, and the stairways of iron.

Foundations of temporary buildings. In the temporary buildings, the foundations under the outside walls and under the columns, are to be of brick or stone. The base course outside, corresponding with the granite base course of the Memorial Hall, will be formed of cement concrete moulded on the brick work. The

Outside walls. outside walls are to be of brick, 13 inches thick for half the height, and 9 inches for the balance, stiffened

Interior columns. inside by timber framing, which also supports the roof. The interior columns and roof trusses are to be composed as far as practicable of timber, such ties and bolts of wrought iron only being introduced as may be necessary for the security of the structure. The roofs

Slate and tin roofing. are to be sheathed with timber and covered with slate, except only the small flat roofs of 24 feet span, which are to be tinned. The floors are to be laid on timber joists,

supported by capped piles driven into the ground to a secure depth. The floor boards are to be laid about ½ inch apart, so as to allow of dust falling in between, as has been done in the most successful of late exhibition buildings. Floors.

Timber and cast iron will be used for the window frames, gable ends of transepts, and the general finish of the temporary portion of the building, the preference being given to the former wherever practicable. In selecting the sizes of timber and iron to be used, it has been arranged to adopt those that can be most readily disposed of in the market after the exhibition is over.

The ventilation of the buildings will be provided for in the construction of the windows, the main tower, in the roofs, and other expedients which will doubtless be found to be ample. Ventilation.

Drainage, Water, and Gas Supply.

Plan No. 8 shows the proposed arrangement of drainage, and of the pipes for the supply of gas and water; the drain pipes are shown in red, the water supply in blue, and the gas in yellow. The roof drainage is distinguished from that of the water closets, kitchens, &c., by being marked in a brighter shade of red; the two being kept entirely separate. The water from the roof of the Memorial Building, is conveyed down by cast iron pipes built in the walls; and that from the roof of the temporary building, by tin pipes placed at frequent intervals, and connecting directly with sewers composed of terra cotta pipe carried in two directions; one draining into Lansdowne Valley, and the other into Sweet Brier Vale. Drainage.

The drainage from the water closets, basins, kitchens, &c., is carried into two lines of 12 inch terra cotta pipe,

which are intended to connect at Belmont avenue with an extension of a six feet sewer, which it is understood the city proposes to construct up Forty-eighth street, for the use of the Exposition.

Water closets.

Urinals.

The water closets in the temporary portions of the building will be constructed with enamelled iron hoppers; the urinals will be made of the same material, and the washstands will have marbelized iron tops and basins, and brass cocks. In the permanent structure, the water closets will be furnished with the best Eureka containers; the urinals will be porcelain, and the washstands will be finished with marble tops, porcelain basins, and silver plated cocks. The Metropolitan safety cock to be adopted throughout, by which a great saving of water will be effected. We have provided in the permanent building for

Wash-stands.

45 Water Closets,
50 Urinals, and
50 Wash Basins,

and in the temporary structure for

108 Water Closets,
150 Urinals, exclusive of Urinal troughs, and
50 Wash Basins.

Water supply.

The water supply has been taken from the 20 inch main on Belmont avenue by two lines of pipe, part of which are 8 inch and part are 6 inch. Thirty-six fire plugs with 2½ inch standard hose attachment, and 100 feet of hose to each, have been provided, the location of the same being shown on Plan No. 2.

Gas supply.

For the gas supply, two 4 inch mains will be sufficient, and these will probably be laid by the city.

It will be noticed that the drain and supply pipes have been arranged, as much as possible, outside of the building, so that they may be easily reached in case of accident without interfering with the exhibits.

Heating.

In regard to the heating, ample provision has been made for boiler surface to heat the rooms of the north and south fronts, and transepts of the Memorial Building, by direct radiation; and to furnish power for the elevators and other machinery necessary for the purposes of the exhibition. Heating.

Future Enlargement of Building.

As it is impossible to determine at present the amount of space that will really be required for the exhibition, it seems to be a *desideratum* that the buildings shall be so designed as to admit of increasing the area by additional portions, which may be added at any time during its construction without affecting the plans or the grounds, and at the same time admit of being incorporated with facility in the system of classification. On Plan No. 2, which represents the first floor, we show a mode previously referred to, by which the space for *classified exhibits* may be increased 195,840 square feet, or 4½ acres, at a moderate expense. The dotted lines *a a* show where additional walls of about 30 feet in height may be built, and connected with the main building by a single span roof of 48 feet. A portion of the restaurants will require removing, and a considerable additional part of the Memorial Hall and temporary transepts is brought into use for *classified exhibits*. This addition increases the total width for the classification to 456 feet; and the longitudinal avenues may be re-arranged and additional width given to each depart- Increase of space for exhibits.

ment space. Our plan of making all the lower windows in the main walls open to the floor, allows of easy communication across the building by passages 10 feet wide, at intervals of 24 feet, virtually throwing all into one floor.

If it should be found advisable to still further increase the classified exhibition space, another addition of 48 feet in width may be made on the north side, in a precisely similar manner, as shown by dotted lines *b b*; and by previously modifying the arrangement of waiting rooms at the main south entrance, 48 feet additional may also be added on the south side, thus furnishing a total area for *classified exhibits* of 25.86 acres.

Proposed Railroad Connections.

Railroad connections.

The supplementary block plan No. 8, shows several proposed lines of track connecting the exhibition grounds with the main railroads. For the delivery of freight, exhibits, and material, the line *a a* connecting in both directions with the Pennsylvania Railroad, will undoubtedly be found the best. A number of sidings are shown at *b b* for the reception of loaded cars, and at *c c* for unloaded cars. Four tracks are introduced into the main building, extending its whole length, and also tracks between the building and Elm avenue. Regular trains on the main line will put off all cars intended for the exhibition on to sidings *b b*, from whence they will be taken by shifting engines, constantly employed for the purpose, and run on to the proper unloading tracks. A

Railroad sidings.

rigorous system to insure promptness in unloading must necessarily be adopted, and the tracks cleared by running the empty cars on to sidings *c c*, from which

they will be taken away by the main line trains. The sidings may be increased in number as found necessary; those now shown on the plan contain the following lengths:

In exhibition building, ...	1½ miles.
Between the building and Elm avenue, . .	2⅛ "
At *b b* and *c c*, ...	4 "
Total, ...	7⅝ "

Passenger stations.

As it regards passenger stations, we propose one at A, on the Junction Railroad, with covered ways to the exhibition building. This will accommodate the Philadelphia and Reading Railroad, and the local trains on the Pennsylvania Railroad from Thirtieth and Market streets. We also propose a station at B for New York Lines, and through trains on the Pennsylvania Railroad. This station may be connected with the New York line by the road *d d*. The expense of this line, however, we think, would be heavy, and we propose a line *e e*, which from the examination we have made of the ground, appears quite feasible, none of the curves being less than 600 feet radius, and the grading light. It joins at the west end with line *a a*, forming a double connection with the main line of the Pennsylvania Railroad, and allowing of almost any desired movements of trains. A line *f f* up Sweet Brier Vale has been suggested. The grade, however, is very heavy. With a rise of 2 feet per hundred, equal to 105½ feet per mile, the track at *g* is 37 feet below the floor of the main building.

We are only able at present to designate what routes are feasible. It will require a more thorough examination of the ground, by a party of engineers detailed for the purpose, to decide exactly the proper locations for the lines in question.

Arrangement of Grounds.

Enclosure. The grounds around the building are to be enclosed by a fence, with proper entrances and exits, as shown on the block plan. Entrances. We have provided for the entrance of carriages as well as for pedestrians, with ample standing room for carriages both on the north and south fronts, and also near the Art Gallery. At the main south front the arrangements are the most extensive, and we believe that visitors can be admitted at as rapid a rate as will ever be required. As this is the principal entrance, we Exit waiting rooms. have provided here ample exit waiting rooms, which may be very desirable in hot or wet weather. This entrance can be connected with the exhibition building, by straight covered ways, if required.

Under-ground passages. Two underground passages have been designed to cross Belmont avenue, and connect with the machinery department. We believe these will prove better than bridges, and offer less obstruction. They will also be found very useful to the Park in the future. They do not require so many steps, and so much labor going up and down, as bridges do.

We would ask the particular attention of the Commission Perspective of Memorial Hall. to the accompanying perspective of the Memorial Building alone, and also to plan No. 9, both of which exhibit the grounds after the temporary buildings have been removed; Fountains. handsome fountains on a sunken terrace being put in their Basins. place and appropriately surrounded. The basins of these fountains are 300 feet long by 90 feet broad, which may be thought large; but those at Sydenham Crystal Palace for grand fountains, are each 750 feet by 450 feet. Care has been taken to utilize the labor on the grading, terraces,

&c., so that no expenditure now necessary for the temporary structures, may be lost; but on the contrary, may constitute a desirable and permanent improvement to the Park.

The Art Gallery,

No change of any importance has been made in the Art Gallery, and we believe that the arrangement of the different rooms, and their various sizes, will be found the best that can be adopted, affording a variety of light to suit different subjects, side lights in the smaller rooms, for sculpture and special paintings, and skylights in the larger rooms. The interior court-yard will be found quite a novelty and exceedingly useful for the exhibition of objects of exterior art-decoration.

All on one floor.

We have purposely avoided introducing more than one floor in the building, as we believe it will be found much more pleasant for visitors, and will insure a more thorough inspection of the objects of art.

Area.

The building contains 2.05 acres of floor space, and the wall length of the interior amounts to 10,800 feet lineal. This can be more than doubled by the introduction of screens or partitions, extending not to the ceiling, but high enough to exhibit pictures on; and these should be curved in the same way as done at Vienna, and shown on our plan in one of the rooms drawn on an enlarged scale.

The specifications do not state that this building will be permanent, and we have not introduced any cellars, or made any provision for heating. If steam heating is required, we would suggest that the boilers be placed away from the building, and the steam conveyed to it, as this will afford much more security from fire.

Materials used in construction.

The foundations of this building are to be of stone or brick, and the exterior above the ground, to the level of the first floor, of cement concrete on brick work. The floor is to be of artificial stone, laid on brick arches, springing from wrought iron I beams. The exterior walls and main partitions are to be of brick, the former built hollow to prevent moisture from entering, and to be available in the ventilation. The roof framing is to be of timber; the skylights to be glazed with heavy 3/8 inch rolled glass, and the light is to be screened by white or tinted muslin, suspended below, the same as adopted in previous exhibitions. The exterior finish of the building, cornices, roofs, &c., we have estimated to be of a temporary nature. As the specifications state that the building is to be sufficiently fire-proof to properly protect the objects of art exhibited, we have provided all we thought requisite in this particular, without increasing the expense any more than necessary.

Permanency of the building.

If it is designed to make the building permanent, we would recommend granite for the exterior base up to the first floor, an iron roof, and a more permanent style of exterior roof finish. These changes would involve an increase in cost, but in view of the large sum which must be expended on the building in any event, it would, we believe, be fully justified, as it would provide permanent accommodation for art purposes until the next Centennial.

Estimates of Cost.

We estimate the cost of the different buildings as follows:

MEMORIAL HALL.

Foundations and stone walls,	$207,693 00
Bricks and brick work,	464,249 00
Dressed stone,	235,126 00
Wrought and cast iron work,	1,124,877 00
Carpenters' work and lumber,	273,463 00
Galvanized iron work,	277,332 00
Hardware,	15,000 00
Plumbing, gas fitting and drainage,	37,000 00
Slate roofing,	56,418 00
Galvanized iron and tin roofing,	70,000 00
Plastering,	12,000 00
Painting and glazing,	179,042 00
Heating and cooking apparatus,	50,000 00
Incidentals,	140,000 00
	$3,142,200 00

TEMPORARY BUILDING.

Foundations and stone walls,	$63,584 00
Bricks and brick work,	261,210 00
Wrought and cast iron,	110,722 00
Carpenters' work and lumber,	474,656 00
Hardware,	30,000 00
Plumbing, gas fitting and drainage,	50,000 00
Slate roofing,	90,000 00
Tinning,	95,000 00
Plastering,	10,000 00
Bells, speaking tubes, &c.,	5,000 00
Painting and glazing,	250,000 00
Incidentals,	100,000 00
	$1,540,172 00

Art Gallery,	$923,800 00

We have been careful in making these estimates to keep *detailed calculations* of the several items of materials and labor necessary, which we are prepared to exhibit to the committee at any time that they may so desire. *They are based upon the prices ruling in the market at the present time*, and are subject to any fluctuations that may occur before the letting of the work. These estimates are for the building alone, and do not include extra decorations, and grading of the grounds, fountains, &c. Neither do they include the laying of tracks for conveying material from the main lines of railroads.

Time Required for Erection of the Design.

If the work is commenced at once, the tracks for conveying material, the drainage, laying of gas and water mains, and some of the grading can be accomplished this fall. The piles for the temporary flooring can be driven during the winter. Material can be ordered and delivered on the ground, with the exception of brick, which could not be obtained in any quantity before April next. The iron work for the Memorial Building and temporary roof trusses can be commenced, and probably a considerable amount delivered before spring. The framing can be started as soon as the lumber arrives on the ground; and there is no reason why the temporary building should not be completed by November, 1874, and the whole, finished and ready for use by January 1st, 1876.

Time of completion.

Much of the work in this design is similar to that already executed in the Grand Central Depot, New York City. The plan dimensions of that building are 240 feet by 696 feet, and the main roof has a span of 200 feet.

Comparison with Grand Central Depot, New York City.

There were used in its construction, some 20,000 barrels of Roman cement; 10,000,000 bricks; 4,000 tons of iron; and 80,000 feet of glass. There are 182 windows, and 41 doors on the outside of the building; 18 stairways inside; 20,000 feet of gas pipe; 2,000 gas burners, and 12 reflectors additional under the main roof; and all of the gas lighting is done by electricity, requiring some 25,000 feet of wire for the purpose. The building is heated by some 15 miles of steam pipe. *The work was begun thereon September 15th, 1869, and the first train went out of the depot October 7th,* 1871, or in 749 days thereafter. As many men were employed as could be profitably kept busy, averaging about 1,000 daily, and the work was carried on regularly. One day was so excessively hot, that all hands were obliged to rest, and three days were so cold that it was impossible to do anything.

We mention this as an example of what *has been done* in this country within a few years, and there is no reason why even more cannot be accomplished, if desirable. These facts will, no doubt, be sufficient to satisfy the Commission that what we propose can be executed within the time stated.

Very respectfully submitted,

JOHN McARTHUR, JR.,

JOSEPH M. WILSON, C. E.,

Architects.

Estimate in Detail.

In accordance with the request of the Commission, by their circular of October 2d, 1873, we hereby furnish the following itemized statement of the quantities and prices of all the material estimated to be necessary to build the structures according to our designs as presented.

In preparing our estimate we have been conscientious, and we feel no doubt but that the Commission can have the buildings constructed for the amounts we have here stated. Our prices and quantities are full, and it is quite probable in working up the finished drawings, that some of the items can be reduced both in amount and price. We have been careful not to under estimate any portion of the work, but have made it a point in every instance to assure ourselves that the figures presented are a maximum.

MEMORIAL BUILDING.

Foundations and stone walls.

18,632½ perches masonry, @ $9.00, . .	$167,693 00	
4,000 perches masonry, @ $10.00, ...	40,000 00	
		$207,693 00

Bricks and brick work.

13,264,257 bricks, @ $35.00, ...	464,249 00

(The price for brick is made to include a large amount of ornamental tile, terra cotta, and stone laid with the brick, that could not be separated in detail, also colored bricks.)

Dressed stone.

78,375 cubic feet, @ $3.00, ...	235,126 00
Carried forward, ...	$907,068 00

Brought forward, ...		$907,068 00
Wrought and cast iron work.		
4,200,000 lbs. wrought iron roof trusses.		
1,259,250 lbs. wrought iron purlins.		
3,200,000 lbs. wrought iron, main tower.		
300,000 lbs. wrought iron, gable ends.		
720,550 lbs. wrought iron, north and south fronts and transept towers.		
9,679,800 lbs. wrought iron, @ 10 c., . .	$967,980 00	
Elevators, main tower, ...	32,000 00	
Stairways, main tower, ...	31,800 00	
1,720,540 lbs. cast iron, @ 5 c., ...	86,027 00	
1,010 feet lineal crest railing on roof, @ $7.00,	7,070 00	
		1,124,877 00
Carpenters' work and lumber.		
143,143 feet B. M. purlins, sheathing and flooring in tower, and flooring in galleries, white pine, @ $70.00, ...	$10,020 00	
807,848 feet B. M. temporary flooring, part hemlock, @ $50.00, ...	40,392 00	
1,377 piles, hemlock, @ $5.00 each, ...	6,885 00	
Carpenters' work and lumber in north and south fronts and transept towers, ...	216,166 00	
		273,463 00
Galvanized iron work.		
Tower, ...	$145,000 00	
Gables, ...	30,000 00	
264 clerestory windows, @ $60.00 each, . .	15,840 00	
198 dormer windows, @ $50.00 each, . . .	9,900 00	
66 main windows, @ $120.00 each, ...	7,920 00	
3,360 feet lineal main cornice, @ $5.00 each,	16,800 00	
Finish in north and south fronts, and transept towers, windows, cornices, roofs, &c., . .	51,872 00	
		277,332 00
Carried forward, ...		$2,582,740 00

Brought forward, ...		$2,582,740 00
Hardware.		
Hardware, ...		15,000 00
Plumbing, gas fitting and drainage.		
7,150 feet lineal 4 inch pipe from roof, @ 60 c.,	$4,290 00	
660 feet lineal 3 inch pipe from corridors, @ 50 c., ...	330 00	
1,270 feet lineal 12 inch, terra cotta, @ 80 c.,	1,016 00	
3,960 feet lineal 4 inch, terra cotta, @ 20 c.,	792 00	
110 4 inch bends, terra cotta, @ 65 c., . . .	75 50	
110 4 inch by 12 inch T's, terra cotta, @ $3.00,	330 00	
22 3 inch by 12 inch T's, terra cotta, @ $3.00,	66 00	
22 3 inch bends, terra cotta, @ 50 c., . . .	11 00	
4,200 feet of 12 inch pipe, terra cotta, @ 80 c.,	3,360 00	
45 water closet containers, $14.00, ...	630 00	
45 water closet basins, @ $5.00, ...	225 00	
45 6 inch by 8 inch T's, terra cotta, @ $1.75,	78 75	
600 feet of 8 inch pipe, terra cotta, @ 45 c., .	270 00	
45 4 lb lead traps, @ $5.00, ...	225 00	
225 feet of 5/8 inch lead supply pipe, @ 50 c., .	112 50	
6 5/8 inch stop and water cocks, @ $2.50, . .	15 00	
360 feet of 3 inch iron pressure pipe, @ 70 c.,	252 00	
1 3 inch stop cock, ...	30 00	
350 feet of 2 inch iron pressure pipe, @ 50 c.,	175 00	
6 2 inch stop cocks, @ $10.00, ...	60 00	
330 feet of 1 inch extra strong lead pipe, @ 80 c., ...	264 00	
300 feet of 5/8 inch extra strong lead pipe, @ 60 c., ...	180 00	
350 feet of 2 inch lead waste pipe, @ 75 c., .	262 50	
6 marble tops, 8 holes each, @ $75.00, . .	450 00	
50 wash basins, @ $3.50, ...	175 00	
Carried forward, ...		$2,597,740 00

Brought forward, ...		$2,597,740 00
50 silver plated basin cocks, @ $6.00, . . .	$300 00	
50 silver plated plugs and washers, @ $2.00, .	100 00	
150 feet of ½ inch extra strong lead pipe, @ 50 c., ...	75 00	
6 ½ inch stop and waste cocks, @ $2.25, . .	13 50	
4 1 inch stop and waste cocks, @ $3.00, . .	12 00	
250 feet of 2 inch cast iron pipe, @ 50 c., . .	125 00	
50 urinals, wedgewood ware, small pattern, @ $7.00, ...	350 00	
50 urinal cocks, plated, @ $5.00, ...	250 00	
1,000 feet of 4 inch pipe, terra cotta, @ 20 c.,	200 00	
4 2 inch stop cocks, @ $10, ...	40 00	
660 feet of 8 inch pipe, terra cotta, @ 45 c., .	297 00	
3500 feet of gas pipe, 6 sizes, @ 20 c., . . .	700 00	
48 reflectors, @ $50.00, ...	2,400 00	
Electrical lighting, ...	5,150 00	
Draining in of water-closets, urinals and basins, ...	1,387 00	
48 6 light brackets, glass drops, under tower, @ $60.00, ...	2,880 00	
Incidentals, ...	9,045 25	
		37,000 00
Slate roofing.		
4,701½ squares slate roofing, @ $12.00, ...		56,418 00
Galvanized iron and tin roofing.		
271,320 square feet galvanized iron roof, No. 22, @ 25 c., ...	$67,830 00	
1887 square feet tin roofing, @ 11 c., . . .	2,170 00	
		70,000 00
Plastering.		
24,000 square yards plastering, @ 50 c., ...		12,000 00
Carried forward, ...		2,773,158 00

Brought forward, ...		$2,773,158 00
Painting and glazing.		
English ribbed glass ¼ thick is intended in the nave and transepts, @ 50 c. per square foot set, and first quality American double thick for north and south fronts and transept towers.		
100,000 square feet glass, @ 50 c., ...	$50,000 00	
Painting nave, transepts and main tower, . .	75,000 00	
Painting and glazing north and south fronts, and transept towers, ...	54,042 00	
		179,042 00
Heating and cooking apparatus.		
Including 8 boilers 14 feet long, 54 inch diameter, 50 horse power each, and 125,000 feet steam pipe, valves, radiators, &c., complete, ...		50,000 00
Incidentals, ...		140,000 00
		$3,142,200 00

TEMPORARY BUILDING.

Foundations and walls.		
We have estimated foundation walls to be of brick.		
3,179,200 bricks in foundations, @ $20.00, ...		$63,584 00
Bricks and brick work above foundations.		
1,000,000 brick, @ $20.00, ...	$20,000 00	
6,030,246 brick, @ $40.00, ...	241,210 00	
		261,210 00
(The item of brick at $40.00 includes ornamental work, colored brick, tiles, &c.)		
Carried forward, ...		$324,794 00

Brought forward, ...		$324,794 00
Wrought and cast iron.		
223,270 lbs. wrought iron bracing rods.		
450,425 lbs. wrought iron ties in roof, 120 feet span.		
471,505 lbs. wrought iron in roof 72 feet span, and corridors.		
1,145,200 lbs. wrought iron, @ 9 c., ...		103,068 00
153,080 lbs. cast iron head and heel blocks, @ 5 c., . .		7,654 00
Carpenters' work and lumber.		
5,665 piles, Hemlock, @ 5.00 each, ...	$28,325 00	
3,356,020 feet B. M. flooring, partly Hemlock, joist and girders, @ 50.00, ...	167,801 00	
5,570,599 feet B. M. framing and sheathing, partly Hemlock, &c., @ $50.00, ...	278,529 95	
		474,656 00
Hardware.		
Hardware, ...		30,000 00
Plumbing, gas fitting and drainage.		
3,960 feet of 12 inch pipe, terra cotta, @ 80 c.,	$3,168 00	
5,476 feet of 10 inch pipe, terra cotta, @ 70 c.,	3,833 20	
4 10 inch turns, terra cotta, @ $3.00, . . .	12 00	
328 4 inch turns, terra cotta @ 20 c., ...	65 60	
328 4 inch by 12 inch T's, terra cotta, @ $3.00,	984 00	
600 feet of 18 inch pipe, terra cotta, @ $1.60,	960 00	
400 feet of 6 inch pipe, terra cotta, @ 30 c., .	120 00	
22,960 feet of 4 inch pipe, terra cotta, @ 20 c.,	4,592 00	
50 iron enamel wash basins, @ $3.00, . . .	150 00	
10 iron enamel tops, 5 holes, each $20.00, . .	200 00	
50 brass cocks, @ $4.00, ...	200 00	
50 brass plugs and washers, @ $1.25, . . .	62 50	
150 ft. of ½ in. extra strong lead pipe, @ 50 c.,	75 00	
Carried forward, ...		$940,172 00

Brought forward, ...		$940,172 00
108 water closet valves, @ $4.00, ...	$432 00	
108 iron enamel water closet hoppers, @ $5.00,	540 00	
108 iron traps, @ $4.00, ...	432 00	
150 feet of 1½ inch lead pipe, waste, @ 60 c.,	90 00	
500 feet of 2 inch iron pipe, @ 50 c., . . .	250 00	
8 2 inch stop cocks, @ $10.00, ...	80 00	
324 ft. of ⅝ in. extra strong lead pipe, @ 50 c.,	162 00	
100 ft. of 1 in. extra strong lead pipe, @ 80 c.,	80 00	
150 iron enamel urinals, @ $5.00, ...	750 00	
150 urinal valve cocks, @ $5.00, ...	750 00	
750 feet of ½ inch supply. pipe, @ 40 c., . .	300 00	
750 feet of 2 inch waste pipe, @ 70 c., . . .	525 00	
36 fire plugs, @ $35.00, ...	1,260 00	
36 stop cocks, @ $30.00, ...	1,080 00	
500 feet of 3 inch iron pipe, @ 70 c., . . .	350 00	
4,700 feet of 6 inch iron pipe, @ $1.17, . .	5,499 00	
2 6 inch stop cocks, @ $80.00, ...	160 00	
36 fire hose couplings, @ $4.00, ...	144 00	
3,600 feet gum hose, @ $1.00, ...	3,600 00	
15,000 feet gas pipe, @ 20 c., ...	3,000 00	
102 reflectors, @ $40.00, ...	4,080 00	
Electrical apparatus for lighting, ...	8,775 00	
Joints and incidental expenses, ...	3,238 70	
		50,000 00
Slate roofing.		
7,500 squares, @ $12, ...		90,000 00
Tinning.		
804,480 square feet tinning, @ 10½ c., . . .	$84,470 40	
30,620 feet lineal 4 inch tin pipe, @ 20 c., . .	6,124 00	
800 eave pipes, @ 25 c., ...	200 00	
15,360 feet lineal gutters, @ 20 c., ...	3,072 00	
	$93,866 40	
Incidentals, ...	1,133 60	
		95,000 00
Carried forward, ...		$1,175,172 00

Brought forward, ...		$1,175,172 00
Plastering.		
20,000 square yards, @ 50 c., ...		10,000 00
Bells, speaking tubes, &c.		
Bells, speaking tubes, &c., ...		5,000 00
Painting and glazing.		
Under the head of glazing we have included window frames and sash, glazed and primed, ready for use. Part of these items properly, should be included in carpenters' work and lumber, but it was more convenient to obtain prices upon the work in this way.		
320 window frames, sash and glass, @ $50.00 each, ...	$16,000 00	
536 clerestory windows, frames, sash and glass, @ $200.00 each, ...	107,200 00	
4 gables in transepts, @ 8,000.00 each, . .	32,000 00	
East and west ends of buildings, ...	4,000 00	
	$159,200 00	
In painting we propose three coats white lead, in oil, tinted, on outside portion of building, and two coats kalsomine, in colors, inside, except at lower parts of columns, which are to have three coats lead in oil.		
Painting, estimated to be	90,000 00	
Incidentals, ...	800 00	
		250,000 00
Incidentals, ...		100,000 00
		$1,540,172 00

ART GALLERY.

Foundations and stone walls.

11,318 perches masonry in foundations, @ $9.00, . . .		$101,862 00
Bricks and brick work.		
1,594,950 bricks in floor, @ $20.00 per m., .	$31,899 00	
4,517,100 bricks in outside walls, @ $35.00 per m., ...	158,098 00	
4,757,277 bricks in inner walls, @ $20.00 per m.	95,145 54	
		285,143 00
Artificial stone work and terra cotta.		
101,267 square feet flooring, @ 30 c., . . .	$30,880 10	
5 sets of steps (the rough form of these steps included under masonry) @ $1,000.00 each,	5,000 00	
36 columns, court yard, interior of columns to be of brick, @ $1,000.00 each, ...	36,000 00	
640 feet lineal, cornice in court, @ $20.00 per foot, ...	12,800 00	
36 statues in court on roof, @ $500.00 each, .	18,000 00	
14 groups statues on roof at entrances, @ $3,000.00 each, ...	42,000 00	
15,960 square feet base course exterior, @ 30 c.,	4,788 00	
		148,968 00
Wrought and cast iron.		
1,582,500 lbs., wrought I beams, for floor, @ 10 c., ...	158,250 00	
120,000 lbs. wrought iron roof trusses, @ 9 c.	10,800 00	
18,000 lbs. cast iron, @ 5 c., ...	900 00	
		169,950 00
Carpenters' work and lumber.		
600,000 feet B. M. lumber, @ $50.00 per m.,	30,000 00	
Doors, and windows, and frames, ...	10,320 00	
Carried forward, ...		$705,923 00

Brought forward, ...		$705,923 00
3,300 feet lineal, cornice, @ $3.00, ...	$6,900 00	
Finish on roof and sky lights, ...	18,780 00	
Incidentals, ...	11,000 00	
		80,000 00
Hardware.		
Hardware, ...		5,000 00
Plumbing, gas fitting and drainage.		
4,000 feet of 8 inch pipe, terra cotta, @ 45 c., .	$1,800 00	
66 4 inch turns, terra cotta, @ 20 c., . . .	13 20	
66 4 inch by 8 inch T's, terra cotta, @ $1.50, .	99 00	
2 8 inch turns, terra cotta, @ $2.50, ...	5 00	
10 iron enamel wash basins, @ $3.00, ...	30 00	
2 tops, 5 holes each, @ $20.00, ...	40 00	
10 brass cocks, @ $4.00, ...	40 00	
10 plugs and washers, @ $1.25, ...	12 50	
30 feet of ½ inch extra strong lead pipe @ 50 c.,	15 00	
6 water closet valves, @ $4.00, ...	24 00	
6 enamel hoppers, @ $5.00, ...	30 00	
6 iron traps, @ $4.00, ...	24 00	
30 feet of ½ inch lead pipe, waste, @ 60 c., .	18 00	
100 feet of 2 inch iron pipe, @ 50 c., ...	50 00	
2 2 inch stop cocks, @ $10.00, ...	20 00	
60 feet of ⅝ inch extra strong lead pipe, @ 50 c.,	30 00	
20 feet of 1 inch extra strong lead pipe, @ 80 c.,	16 00	
6 iron enamel urinals, @ $5.00, ...	30 00	
6 urinal valve cocks, @ $5.00, ...	30 00	
45 feet of ½ inch supply pipe, @ 40 c., . . .	18 00	
45 feet of 2 inch waste pipe, @ 70 c., ...	31 50	
4 fire plugs, @ $35,00, ...	140 00	
4 stop cocks, @ $30.00, ...	120 00	
Carried forward, ...		$790,923 00

Brought forward, ...		$790,923 00
1,200 feet of 3 inch iron pipe, @ 70 c., . . .	$840 00	
400 feet of 6 inch iron pipe, @ $1.17, ...	468 00	
2 3 inch stop cocks, @ $30.00, ...	60 00	
4 fire hose couplings, @ $4.00, ...	16 00	
400 feet of gum hose, @ $1.00, ...	400 00	
7,200 feet of gas pipe and burners, @ 30 c, . .	2,160 00	
Electrical lighting, ...	2,000 00	
Incidentals, ...	1,390 00	
		9,970 00
Slate roofing.		
432 squares slate roofing, @ $12.00, ...		5,184 00
Tinning.		
68,000 square feet tin roofing, @ 10½ c., . .	$7,140 00	
3,300 feet lineal spouting, @ 20 c, ...	660 00	
3,330 feet lineal gutter, @ 20 c., ...	666 00	
66 eave pipes, @ 25 c., ...	16 50	
		8,483 00
Plastering.		
56,840 square yards plastering, @ 50 c., ...		28,420 00
Painting and glazing.		
31,200 square feet of ⅜ inch ribbed English skylight glass, @ 60 c., ...	$18,720 00	
7,000 square feet first quality American glass for windows, @ 30 c., ...	2,100 00	
Painting, ...	20,000 00	
		40,820 00
Incidentals, ...		40,000 00
		$923,800 00